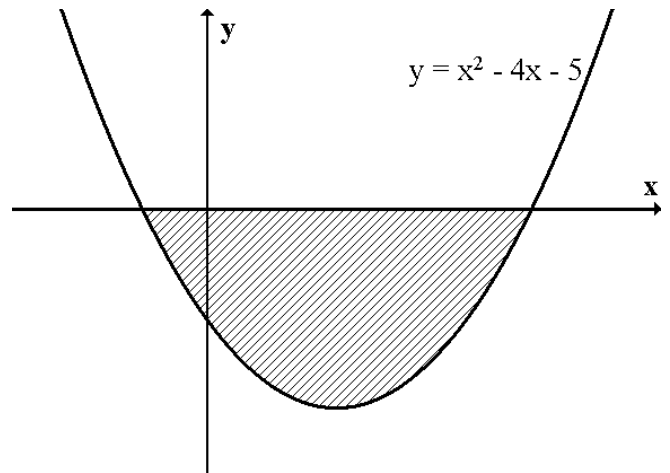


Higher Mathematics
Supported Study 7

1. The diagram opposite shows part of the curve

$$y = x^2 - 4x - 5.$$

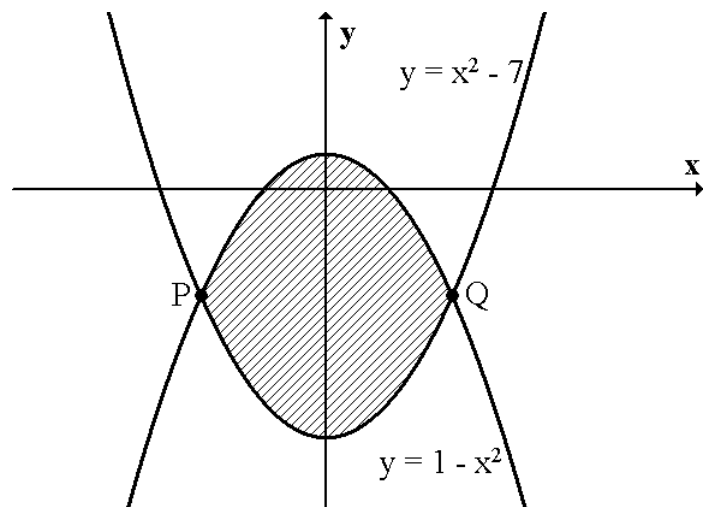
Calculate the shaded area.



2. The diagram shows the graphs of

$$y = x^2 - 7 \quad \text{and} \quad y = 1 - x^2$$

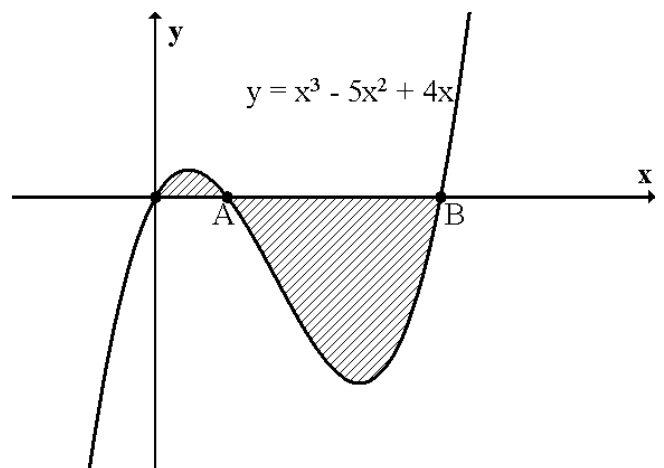
- (a) Find the coordinates of P and Q.
(b) Calculate the shaded area.



3. The diagram shows the curve

$$y = x^3 - 5x^2 + 4x$$

- (a) Find the coordinates of A and B.
(b) Calculate the shaded area.



4. $f'(x) = 3x^2 - 6x + 5$ and $f(2) = 4$. Find a formula for $f(x)$.

5. $\frac{dy}{dx} = \frac{5x^2 - 1}{\sqrt{x}}$. Find a formula for y given $y = 45$ when $x = 4$.

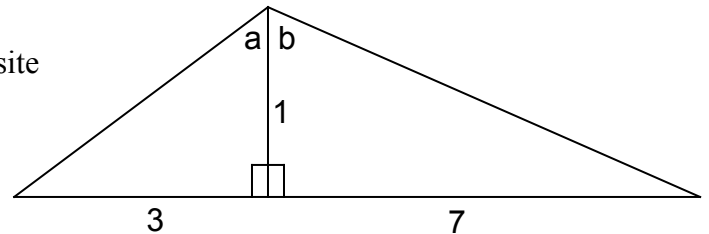
6. Given $\tan x = \frac{1}{5}$, find the exact value of

- (a) $\sin 2x$ (b) $\cos 2x$ (c) $\tan 2x$

7. Given $\sin A = \frac{1}{\sqrt{5}}$, find the exact value of

- (a) $\sin 2A$ (b) $\sin 4A$

8. Given the information in the diagram opposite find the exact value of $\cos(a + b)$.



9. (a) Show that the curve $y = x^3 + x^2 + 7x - 4$ and the line $y = 2x + 3$ intersect at the point (1,5).

(b) Prove that the line and the curve have no other points of intersection.

10.(a) Show that the curve $y = x^4 - 4x^2 - 16x + 10$ has a stationary point at (2,-22).

(b) Prove that the curve has no other stationary points.

11. The curve with equation $y = x^2 - (2t + 2)x + t^2 + 3t - 1$ has equal roots.

Find the value of t.

12. Show that the roots of $(p - 2)x^2 - (3p - 2)x + 2p = 0$ are always real.